Tinkering at Home: Creating Equitable Engineering and Spatial Learning Opportunities for Latine Children and Families during the COVID-19 Pandemic

Diana I. Acosta[1], Catherine A. Haden[1], & Kim Koin[2]

Loyola University Chicago[1] & Chicago Children's Museum[2]

INTRODUCTION

- Hands-on tinkering experiences can help promote more equitable STEM learning opportunities for children from diverse backgrounds (Bevan, 2017; Vossoughi & Bevan, 2014).
- Latine heritage families naturally engage in and talk about engineering practices during and after tinkering in a children's museum (Acosta & Haden, in press).
- We asked how the everyday practice of oral stories and storytelling could be leveraged during an at-home tinkering activity to support children's informal engineering and spatial learning.

PARTICIPANTS

- 52 Latine parents and their 4-10 year old children (M = 7.69; 23 girls, 29 boys)
  - 92% of parents were of Mexican heritage
  - Parent schooling ranged from 6-24 years (M = 14.57, SD = 4.66)
  - 33% of parents reported speaking to their children in Spanish only, 62% spoke to their children in English and Spanish
  - 50% of families earned less than $50,000 a year

TINKERING VIDEO INVITATIONS

- We designed and recorded a video invitation in English and Spanish for an at-home tinkering activity that was framed with an oral story – to make a party hat out of everyday materials.
- The activity had two engineering challenges: (1) the hat had to fit on the child's head, and (2) the hat could not fall off when the child jumped up and down.
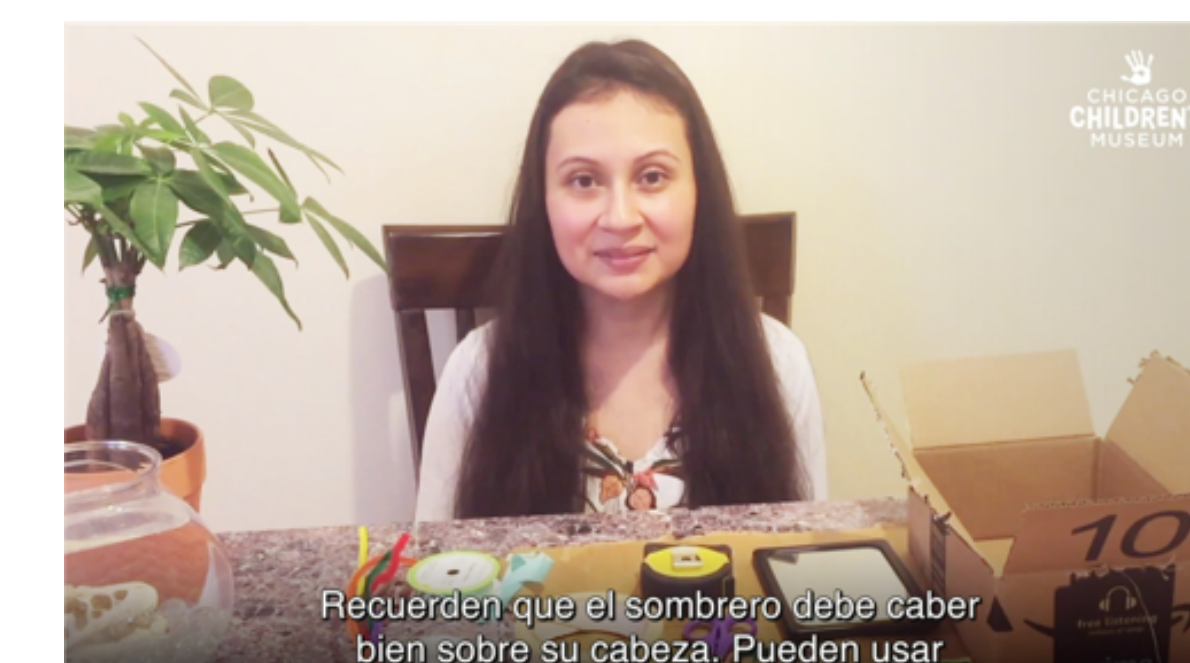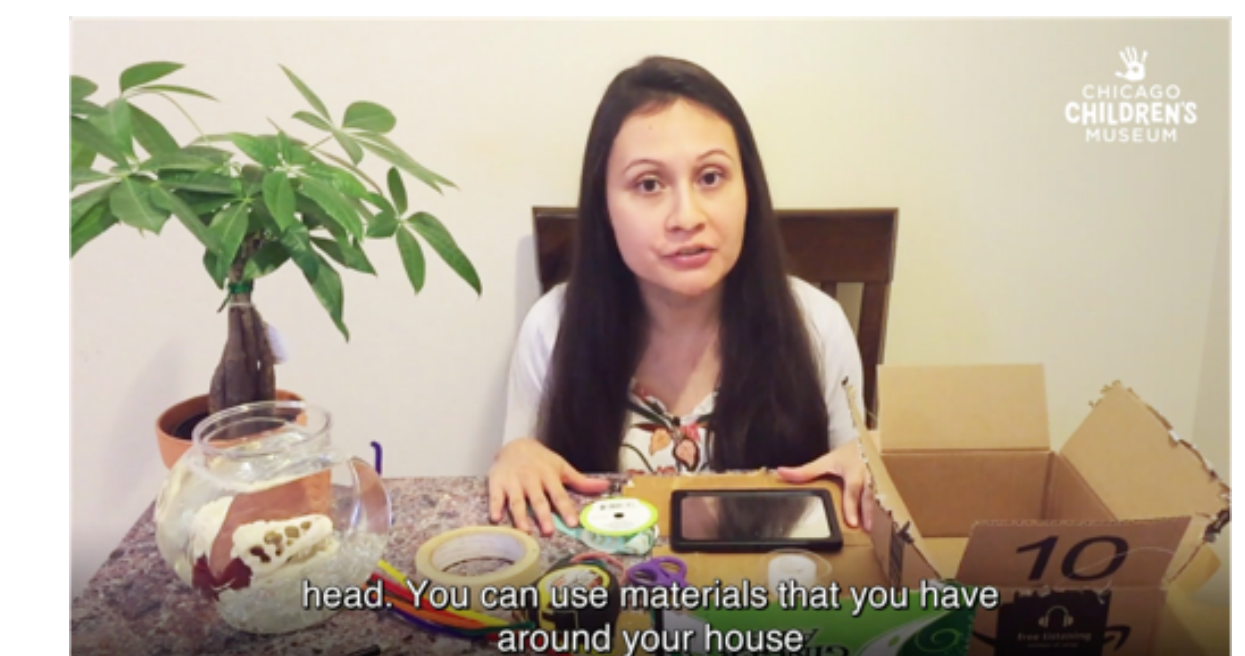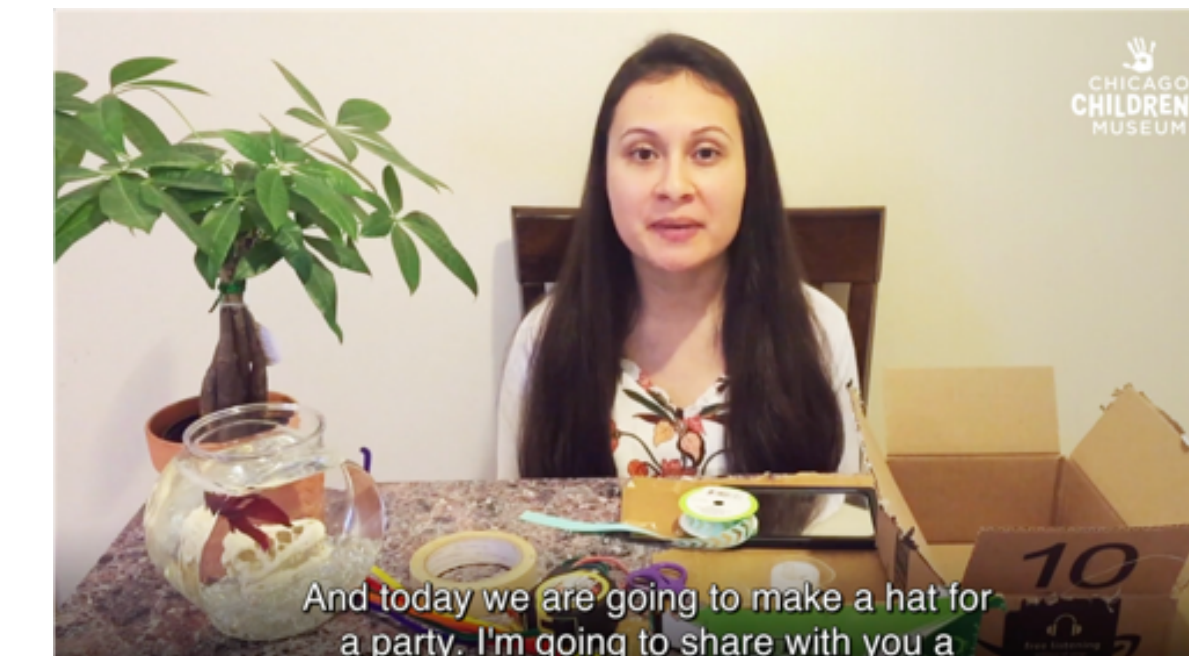
PARENT-CHILD CONVERSATIONS DURING TINKERING

- Data collection occurred via Zoom. We provided tablets to families who did not have a web-enabled device.
- Families met with a bilingual researcher and were observed as they participated in the tinkering activity from their homes.
- Families used engineering and spatial language while tinkering:

> Parent: "You wanna try it on?"
> *Child tries on hat and it falls off.*
> Parent: "What should we do to make it stick on top?"
> Child: "Tape."

- Families used their prior experiences to create a story for their party hat:

> Child: "It was a princess party."
> Parent: "And then why did they ask you to make a hat?"
> Child: "There was going to be a party."
> Parent: "But was there going to be like a contest or something? Like today, what was happening in your classroom? Crazy hat day?"
> Child: "Yes."
> Parent: "Maybe at the party there was going to be a crazy hat contest and that's why they asked you to bring a hat."

CHILDREN'S REFLECTIONS POST-TINKERING

- Children's reflections on their tinkering experience were elicited immediately after the activity and approximately two weeks later, with 100% of children participating in the follow-up.
- Children used engineering and spatial language in their reflections:

> "I wanted it to be a cone except it was super tall and long. So then we had to cut the bottom off so it would keep the shape but it would be shorter."

IMPLICATIONS

- Our study is informing the design of tinkering programs in *Tinkering Lab*, an exhibit at Chicago Children's Museum, and future online studies with Latine families and children.